

THE CHROMOSOMES OF *Succinea australis* (FÉRUSSAC)

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SUMMARY

The chromosome number of *Succinea australis* (Férussac) from four localities in South Australia is $n=18$; the largest chromosome pair of the complement is metacentric.

INTRODUCTION

During the past few years a number of studies of the chromosomes of the Succineidae have been published. Haploid chromosome numbers of $n=5$ and $n=6$ have been demonstrated for the anatomically more primitive Catinellinae (Burch, 1964a, 1964b; Butot & Kiauta, 1967) and of $n=12$ to $n=22$ for the more advanced Succineinae (Natarajan, Hubright & Burch, 1966; Burch, Patterson and Natarajan, 1966; Burch, 1967) apparently supporting a correlation of low chromosome number with "primitiveness." However, Patterson's reports (1968, 1970) of $n=25$ in the primitive genus *Quickia* question either the validity of a primitive—low chromosome number correlation in the Succineidae, or the position of *Quickia* in the family. The wide range of chromosome number known for the family, the karyotype information which is available for a number of species, and the problems of relating anatomical and cytological information, make this an extremely interesting group for which any further observations are of value. *Succinea australis* (Férussac) has already been studied anatomically (Quick, 1941) and this paper describes the cytology of this southern Australian species,

MATERIALS AND METHODS

Succinea australis is the common amber snail of South Australia and Victoria. The species was studied anatomically by Quick (1941) and is a member of the Succineinae, being closely allied to *S. striata* Krauss. Chromosome counts were made from snails taken at the localities given in Table 1, and duplicate voucher specimens are in the collections of the South Australian Museum. Specimens from Blanchtown were dissected and found to agree with Quick's description for the species.

Pieces of ovotestis were squashed in aceto-orcein, no prior fixation being used. A selection of slides was made permanent by inverting in absolute alcohol to soak off the coverslips which were then replaced with Euparal.

RESULTS

The chromosome number of *Succinea australis* from all localities in Table 1 was $n=18$ (Figure 1).

In this species, as in other land snails, large-nucleate cells are associated with the spermatogenic tissues. In Port Gawler specimens of *S. australis* these large nuclei were highly polyploid (figure 2). A number of mitotic divisions showed triploid, tetraploid and hexaploid chromosome complements (figures 3, 4 and 5); the mitotic metaphase of the tetraploid cell of figure 5 shows the largest chromosome of the complement to be metacentric. In the cell shown in figure 4 some daughter chromosomes have already separated and in that in figure 3 separation is complete but a number of pairs of daughter chromosomes can still be identified. It appears that in these cells chromosome number is being built up at mitosis by failure of spindle formation and of normal anaphase separation, i.e. endomitosis.

DISCUSSION

The haploid numbers 17, 18, 19, 21 and 22 have been previously reported for the genus *Succinea* (Burch, 1967). The species *S. concordialis*, *S. greeri*, *S. urbana*, *S. campestris* and *S. luteola*, all of which are native to the United States of America, have $n=18$ as shown here for *S. australis*. In *S. greeri* and *S. urbana* the largest chromosome pair is submetacentric and in *S. concordialis* (Natarajan, Hubright and Burch, 1966, fig. 2) it is apparently metacentric as in *S. australis*. At present, subgeneric groupings in *Succinea* are not well understood and a thorough anatomical study of members of the genus is necessary. It will be of interest to see if groupings made on the basis of chromosome morphology and number correspond to those established on an anatomical and morphological basis.

Table 1
COLLECTIONS OF *SUCCINEA AUSTRALIS* USED FOR
CHROMOSOME STUDIES

| Locality | South Aust. Museum Registered number |
|------------------------------|---|
| Rosetta Head, Encounter Bay | D.14820 |
| Kingston, South-east of S.A. | destroyed in dissection |
| Port Gawler | D.14870 |
| Blanchetown | D.15010 |

TEXT Figure 1 - 5

1. Meiotic diakinesis chromosomes of two cells in *Succinea australis*; the larger densely stained bodies are sperm heads.
2. The large polyploid nucleus of a cell associated with the spermatogenic tissues.
3. A hexaploid cell; recent chromosome division and separation has occurred and some pairs of daughter chromosomes can still be identified.
4. Endomitotic metaphase in a triploid cell; some daughter chromosomes have separated.
5. Endomitotic metaphase in a tetraploid cell.



REFERENCES

- BURCH, J. B., 1964a. The chromosomes of *Catinella vermeta* (Mollusca, Euthyneura, Succineidae). *Acta biol. Acad. Sci. Hung.*, 15 (1): 87-94.
- , 1964b. Chromosomes of the succineid snail *Catinella rotundata*. *Occ. Paps. Mus. Zool., Univ. Michigan.*, No. 638: 1-8.
- , 1967. Cytological relationships of some Pacific Gastropods. *Venus, Jap. J. Malacol.*, 25 (3 & 4): 118-135.
- , Patterson, C. M. & Natarajan, R., 1966. Chromosomes of four species of North American Succineidae. *Venus, Jap. J. Malacol.*, 24 (4): 342-353.
- BUTOT, L. J. M., & KIAUTA, B., 1967. The chromosomes of *Catinella arenaria* (Bouchard-Chantereaux, 1837) with a review of the cytological conditions within the genus *Catinella* and considerations of the phylogenetic position of the Succinoidea ord. nov. (Gastropoda, Euthyneura) *Beaufortia*, 174: 157-164.
- NATARAJAN, R., HUBRIGHT, L., & BURCH, J. B., 1966. Chromosomes of eight species of Succineidae (Gastropoda, Stylommatophora) from the southern United States. *Acta biol. Acad. Sci. Hung.*, 17 (1): 105-120.
- PATTERSON, C. M., 1968. The reproductive anatomy and chromosome number of *Quikia spurca* (Gould) (Stylommatophora: Heterurethra: Succineidae). *Malacol. Rev.*, 1: 1-13.
- , 1970. Morphological and cytological studies of the succineid genus *Quikia* from India. *Malacol. Rev.*, 3: 25-36.
- QUICK, H. E., 1941. The anatomy of some African Succineae, and of *Succinea hungarica* Hazay and *S. australis* Férussac for comparison. *Ann. Natal Mus.*, 8 (1): 19-45, 4 plates.